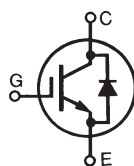


1200V XPT™ IGBT GenX3™ w/ Diode

IXYB82N120C3H1

High-Speed IGBT
for 20-50 kHz Switching



$$V_{CES} = 1200V$$

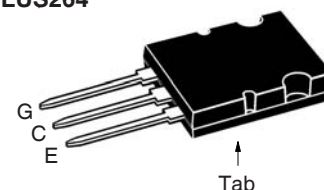
$$I_{C110} = 82A$$

$$V_{CE(sat)} \leq 3.2V$$

$$t_{fi(typ)} = 93ns$$

| Symbol | Test Conditions | Maximum Ratings | |
|-------------------------------|---|---|------------|
| V_{CES} | $T_J = 25^\circ C$ to $150^\circ C$ | 1200 | V |
| V_{CGR} | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$ | 1200 | V |
| V_{GES} | Continuous | ± 20 | V |
| V_{GEM} | Transient | ± 30 | V |
| I_{C25} | $T_C = 25^\circ C$ (Chip Capability) | 164 | A |
| I_{LRMS} | Lead Current Limit | 160 | A |
| I_{C110} | $T_C = 110^\circ C$ | 82 | A |
| I_{F110} | $T_C = 110^\circ C$ | 42 | A |
| I_{CM} | $T_C = 25^\circ C$, 1ms | 320 | A |
| SSOA (RBSOA) | $V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 2\Omega$ Clamped Inductive Load | $I_{CM} = 164$ @ $V_{CE} \leq V_{CES}$ | A |
| P_C | $T_C = 25^\circ C$ | 1040 | W |
| T_J | | -55 ... +150 | $^\circ C$ |
| T_{JM} | | 150 | $^\circ C$ |
| T_{stg} | | -55 ... +150 | $^\circ C$ |
| T_L | Maximum Lead Temperature for Soldering | 300 | $^\circ C$ |
| T_{SOLD} | 1.6 mm (0.062in.) from Case for 10s | 260 | $^\circ C$ |
| F_C | Mounting Force | 30..120 / 6.7..27 | N/lb. |
| Weight | | 10 | g |

PLUS264™



G = Gate C = Collector
E = Emitter Tab = Collector

Features

- Optimized for Low Switching Losses
- Square RBSOA
- Anti-Parallel Ultra Fast Diode
- Positive Thermal Coefficient of $V_{ce(sat)}$
- High Current Handling Capability
- International Standard Package

Advantages

- High Power Density
- Low Gate Drive Requirement

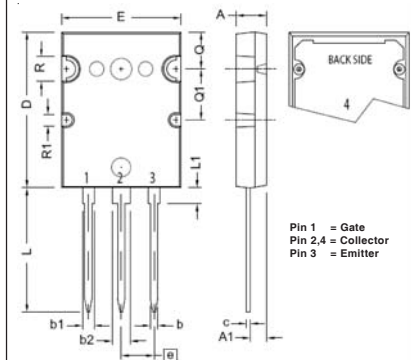
Applications

- High Frequency Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

| Symbol | Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified) | Characteristic Values | | |
|---------------|---|-----------------------|--------------|--------------------|
| | | Min. | Typ. | Max. |
| BV_{CES} | $I_C = 250\mu A$, $V_{GE} = 0V$ | 1200 | | V |
| $V_{GE(th)}$ | $I_C = 250\mu A$, $V_{CE} = V_{GE}$ | 3.0 | | V |
| I_{CES} | $V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ C$ | | | 50 μA 3 mA |
| I_{GES} | $V_{CE} = 0V$, $V_{GE} = \pm 20V$ | | | ± 100 nA |
| $V_{CE(sat)}$ | $I_C = 82A$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ C$ | | 2.75 3.50 | V V |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified) | Characteristic Values | | |
|--------------|---|-----------------------|------|--------------------|
| | | Min. | Typ. | Max. |
| g_{fs} | $I_C = 60\text{A}, V_{CE} = 10\text{V}$, Note 1 | 30 | 50 | S |
| C_{ies} | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$ | | 4060 | pF |
| C_{oes} | | | 285 | pF |
| C_{res} | | | 110 | pF |
| $Q_{g(on)}$ | $I_C = 82\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$ | | 215 | nC |
| Q_{ge} | | | 26 | nC |
| Q_{gc} | | | 84 | nC |
| $t_{d(on)}$ | Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 80\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 2\Omega$ Note 2 | | 29 | ns |
| t_{ri} | | | 78 | ns |
| E_{on} | | | 4.95 | mJ |
| $t_{d(off)}$ | | | 192 | 280 ns |
| t_{fi} | | | 93 | ns |
| E_{off} | | | 2.78 | 5.00 mJ |
| $t_{d(on)}$ | Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 80\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 2\Omega$ Note 2 | | 29 | ns |
| t_{ri} | | | 90 | ns |
| E_{on} | | | 7.45 | mJ |
| $t_{d(off)}$ | | | 200 | ns |
| t_{fi} | | | 95 | ns |
| E_{off} | | | 3.70 | mJ |
| R_{thJC} | | | 0.12 | $^\circ\text{C/W}$ |
| R_{thCS} | | 0.13 | | $^\circ\text{C/W}$ |

PLUS264™ (IXYB) Outline



| Dim. | Millimeter | | Inches | |
|------|------------|-------|-----------|-------|
| | min | max | min | max |
| A | 4.70 | 5.31 | 0.185 | 0.209 |
| A1 | 2.59 | 3.00 | 0.102 | 0.118 |
| b | 0.94 | 1.40 | 0.037 | 0.055 |
| b1 | 2.21 | 2.59 | 0.087 | 0.102 |
| b2 | 2.79 | 3.20 | 0.110 | 0.126 |
| c | 0.43 | 0.74 | 0.017 | 0.029 |
| D | 25.58 | 26.59 | 1.007 | 1.047 |
| E | 19.30 | 20.29 | 0.760 | 0.799 |
| e | 5.45 BSC | | 0.215 BSC | |
| L | 19.79 | 21.39 | 0.779 | 0.842 |
| L1 | 2.21 | 2.59 | 0.087 | 0.102 |
| Q | 6.10 | 6.50 | 0.240 | 0.256 |
| Q1 | 8.38 | 8.79 | 0.330 | 0.346 |
| QR | 3.94 | 4.75 | 0.155 | 0.187 |
| QR1 | 2.16 | 2.36 | 0.085 | 0.093 |

Reverse Diode (FRED)

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|------------|--|-----------------------|------|-------------------------|
| | | Min. | Typ. | Max. |
| V_F | $I_F = 60\text{A}, V_{GE} = 0\text{V}$, Note 1 $T_J = 125^\circ\text{C}$ | | 1.9 | 2.7 V |
| I_{RM} | $I_F = 60\text{A}, V_{GE} = 0\text{V}, T_J = 125^\circ\text{C}$ $-di_F/dt = 700\text{A}/\mu\text{s}, V_R = 600\text{V}$ | | 41 | A |
| t_{rr} | | | 420 | ns |
| R_{thJC} | | | | 0.35 $^\circ\text{C/W}$ |

Notes:

1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.
2. Switching times & energy losses may increase for higher $V_{CE}(\text{clamp})$, T_J or R_G .

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

| | | | | | | | | | | |
|--|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: | 4,835,592 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665 | 6,404,065 B1 | 6,683,344 | 6,727,585 | 7,005,734 B2 | 7,157,338B2 |
| | 4,860,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343 | 6,710,405 B2 | 6,759,692 | 7,063,975 B2 | |
| | 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728 B1 | 6,583,505 | 6,710,463 | 6,771,478 B2 | 7,071,537 | |

Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

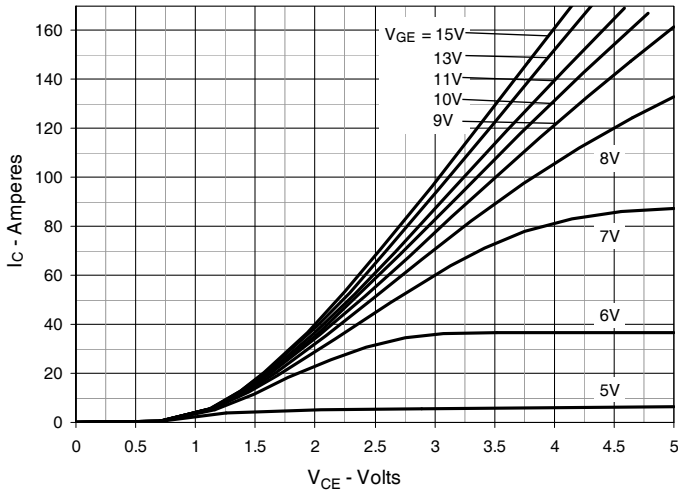


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

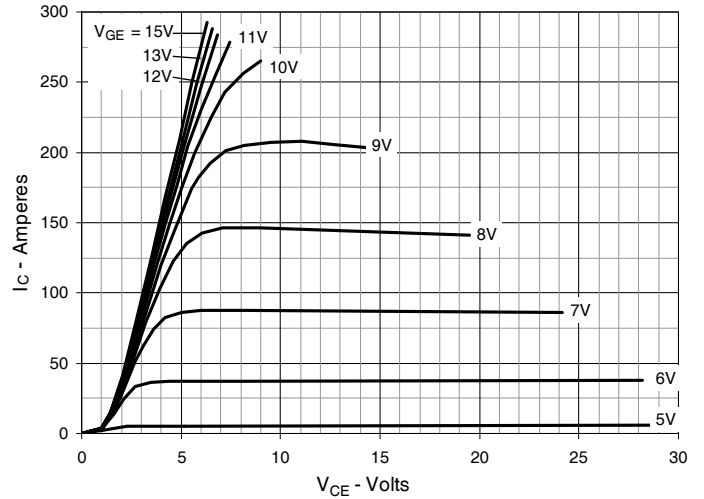


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

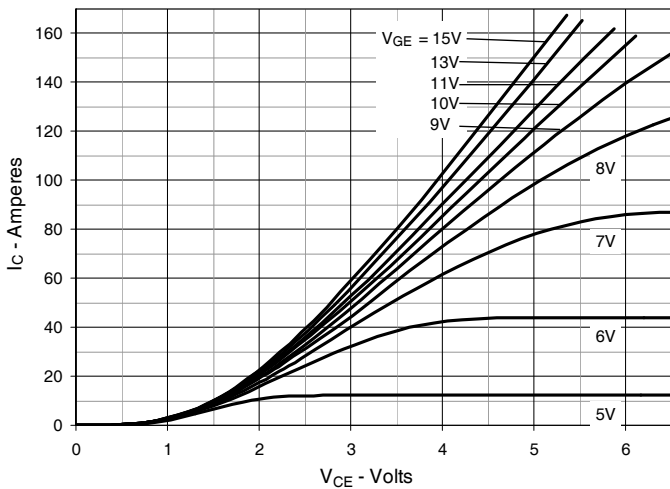


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

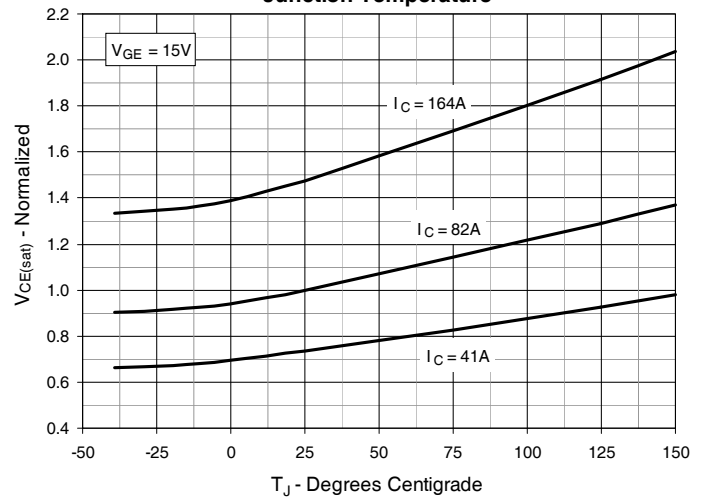


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

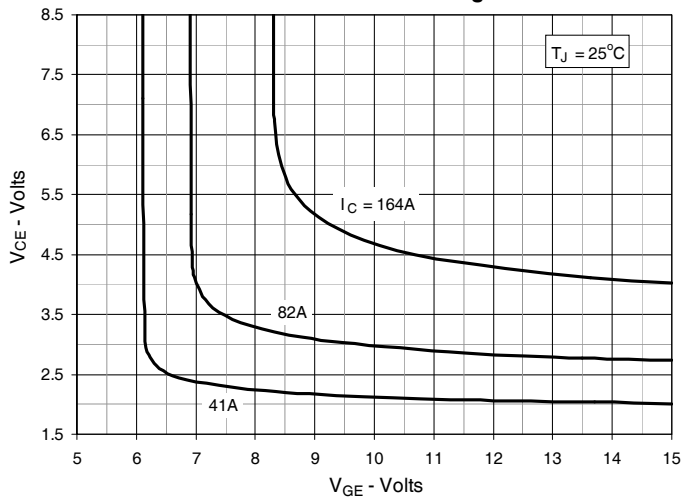


Fig. 6. Input Admittance

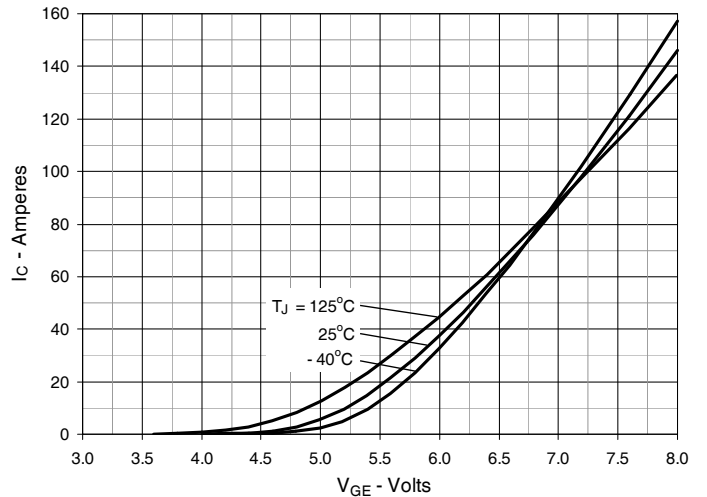


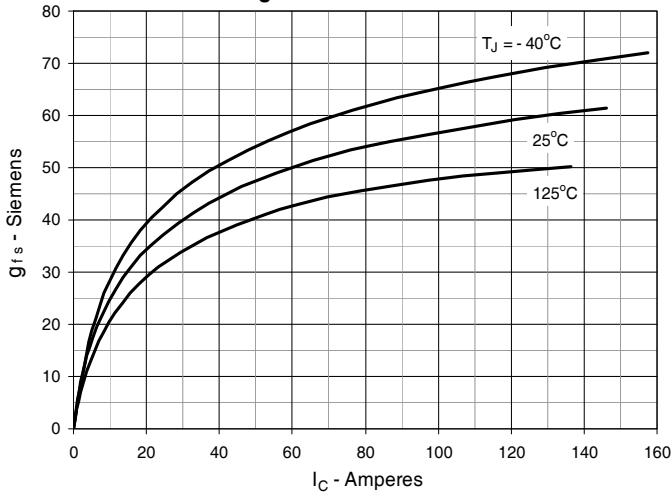
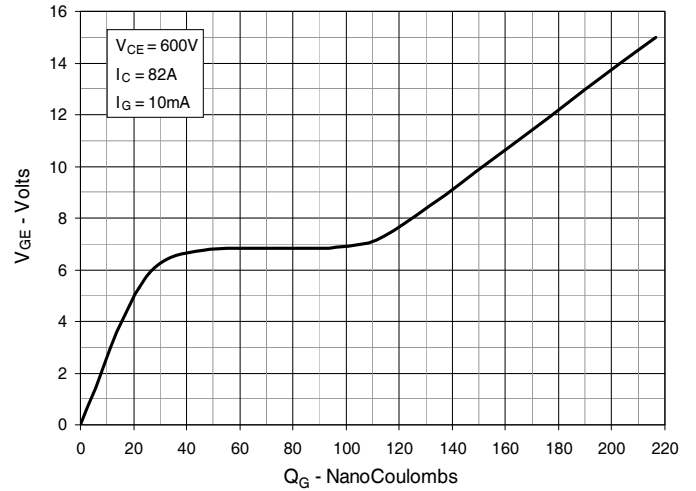
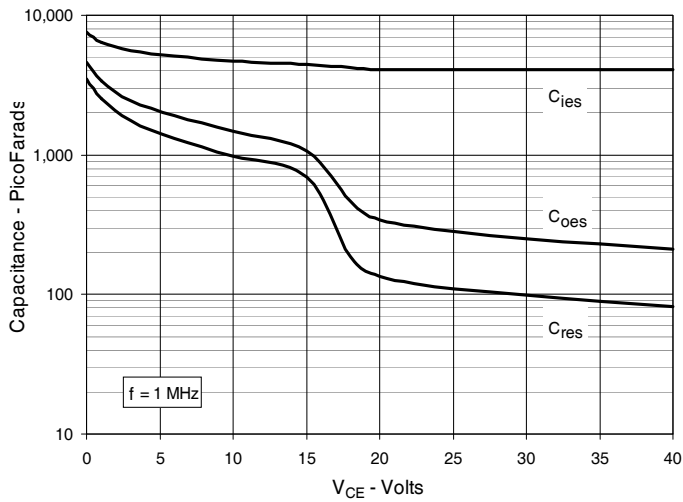
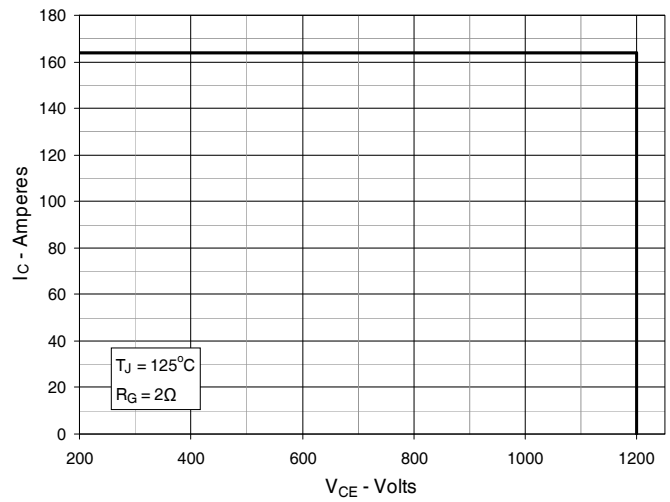
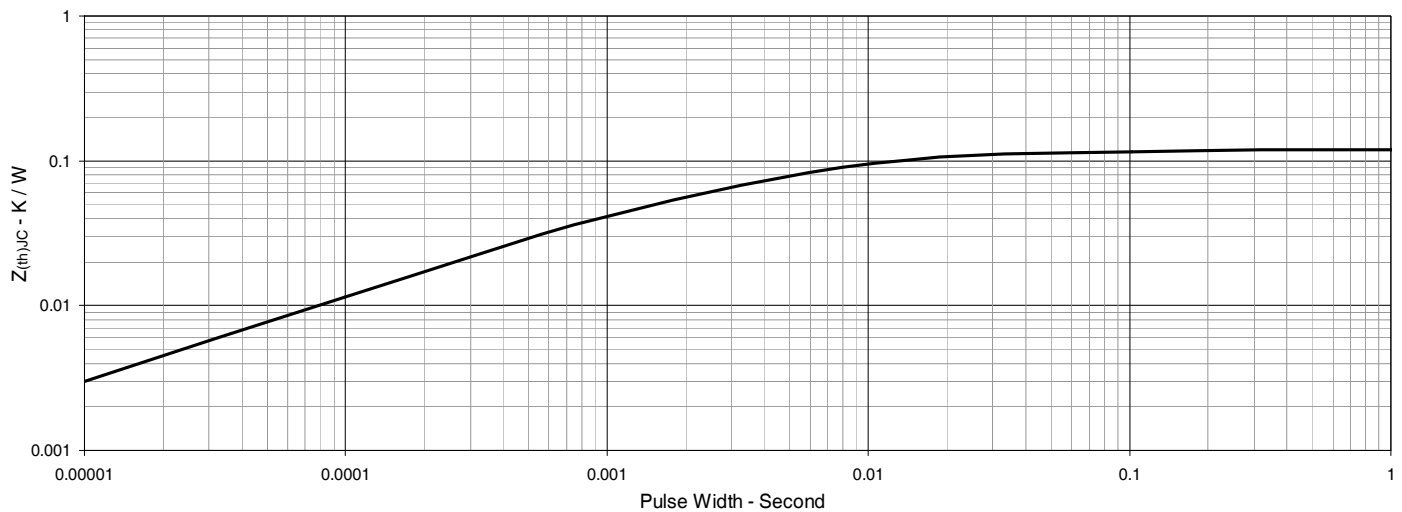
Fig. 7. Transconductance

Fig. 8. Gate Charge

Fig. 9. Capacitance

Fig. 10. Reverse-Bias Safe Operating Area

Fig. 11. Maximum Transient Thermal Impedance


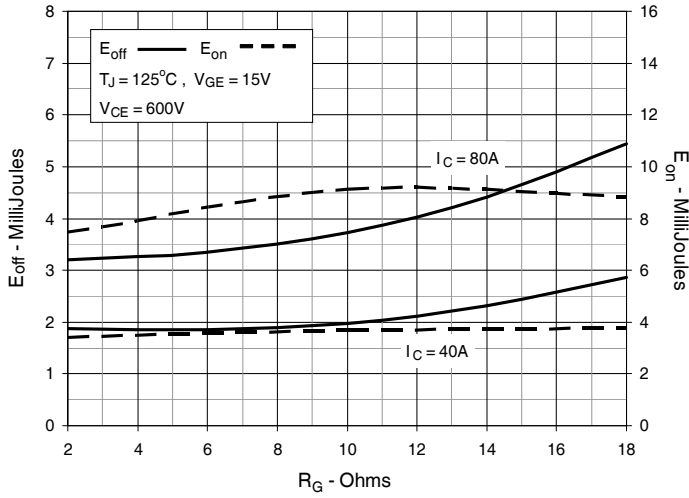
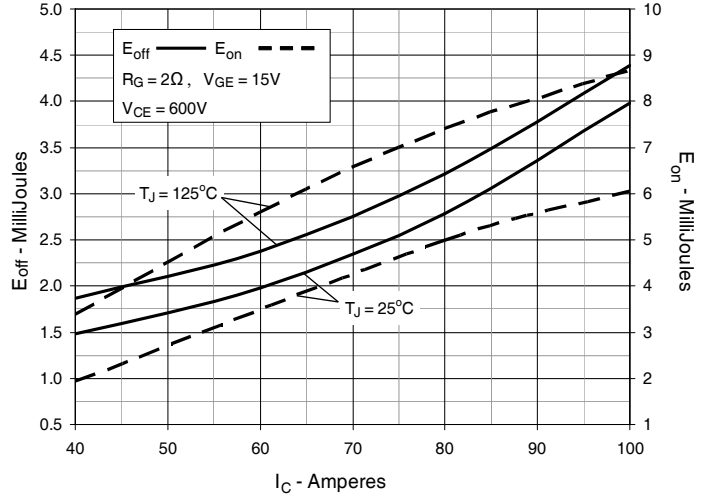
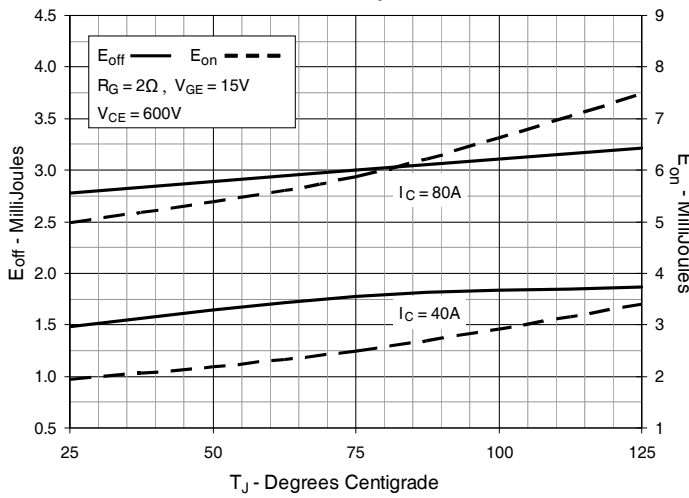
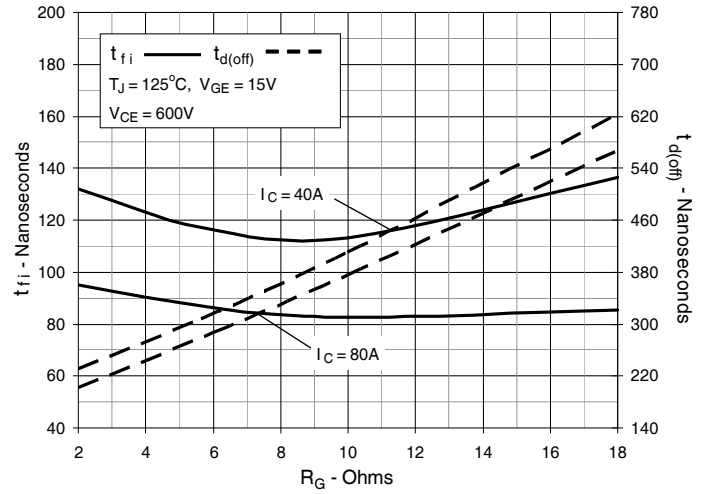
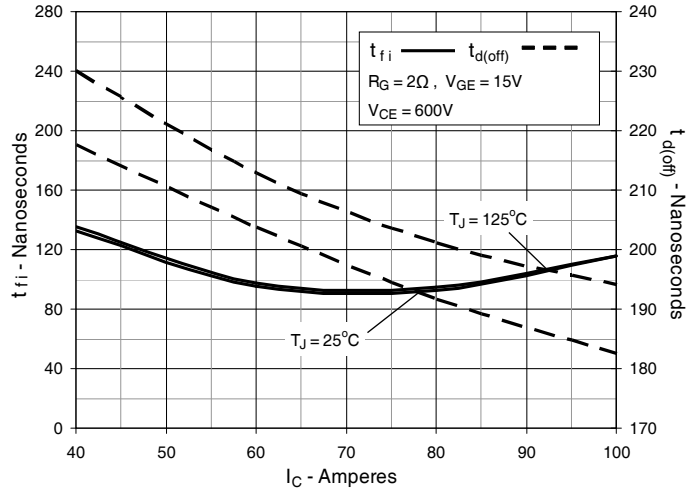
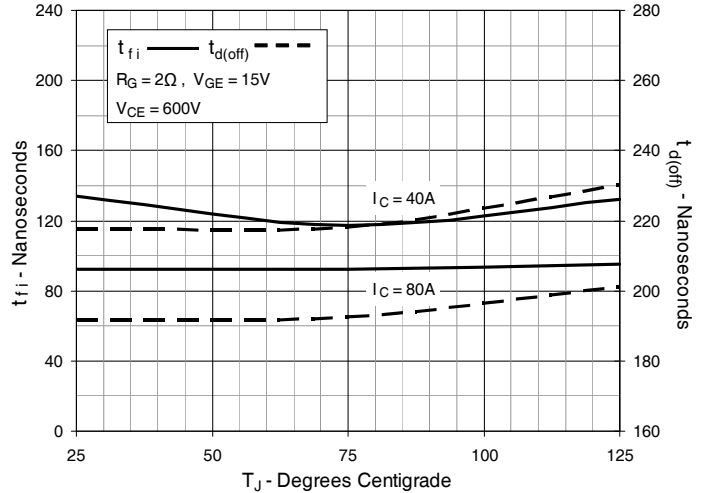
Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

Fig. 13. Inductive Switching Energy Loss vs. Collector Current

Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

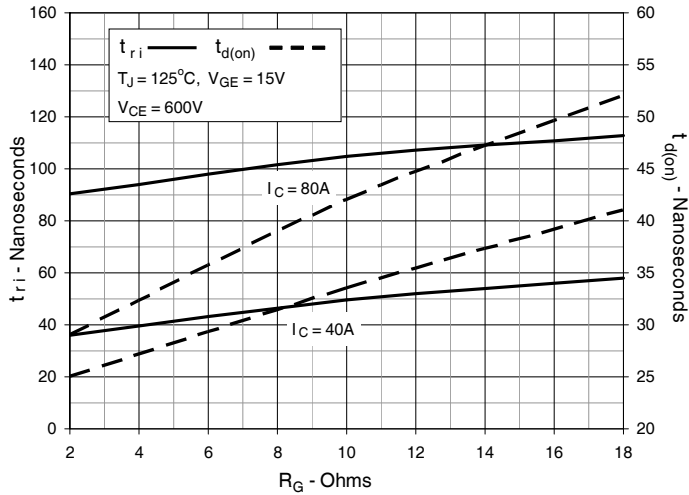


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

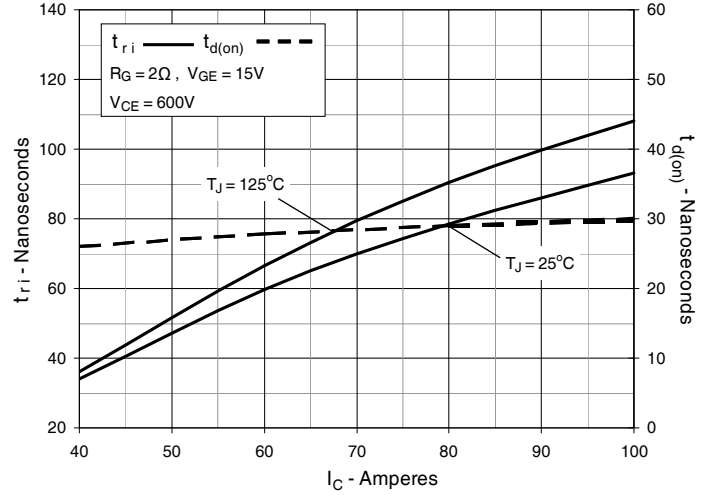


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

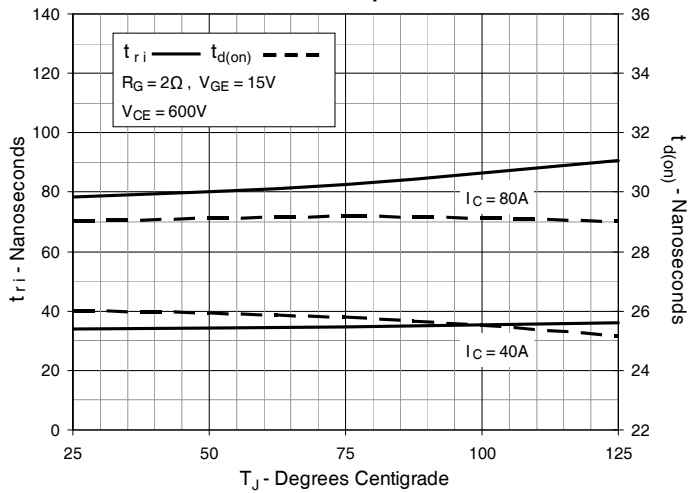


Fig. 21. Forward Characteristics

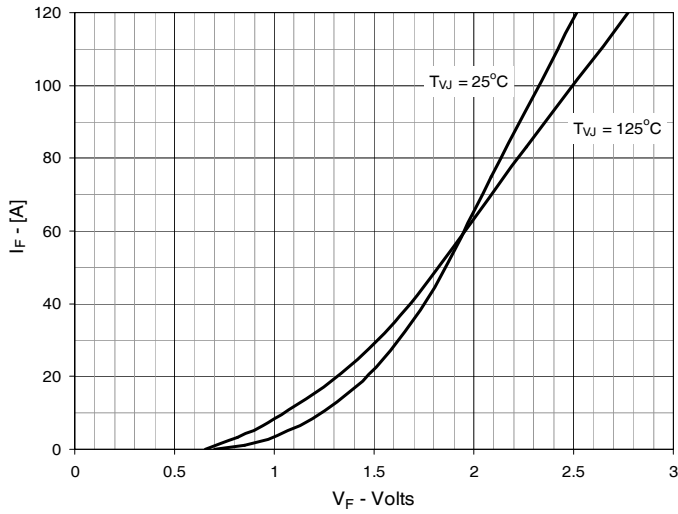


Fig. 22. Reverse Recovery Charge Q_{rr} vs. $-di_F/dt$

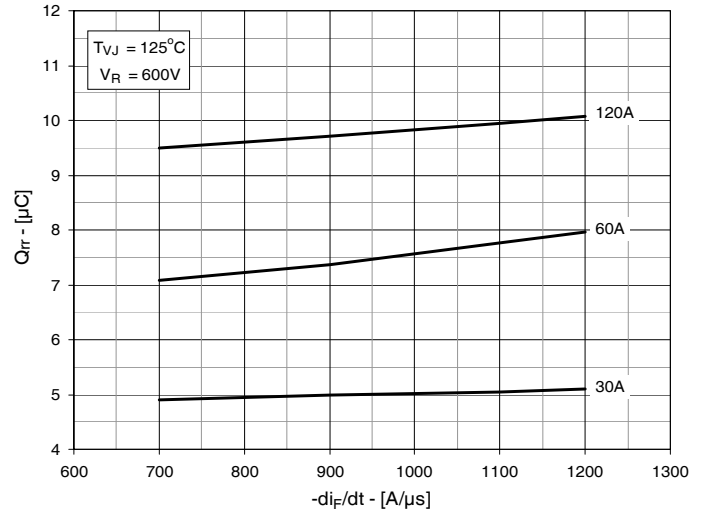


Fig. 23. Peak Reverse Current I_{RM} vs. $-di_F/dt$

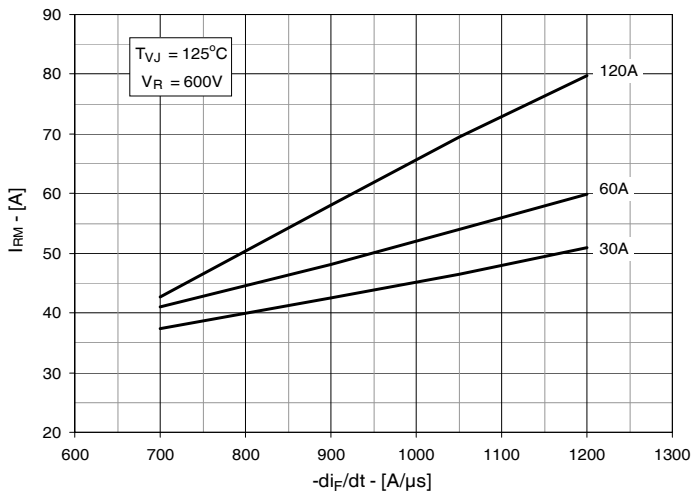


Fig. 24. Recovery Time t_{rr} vs. $-di_F/dt$

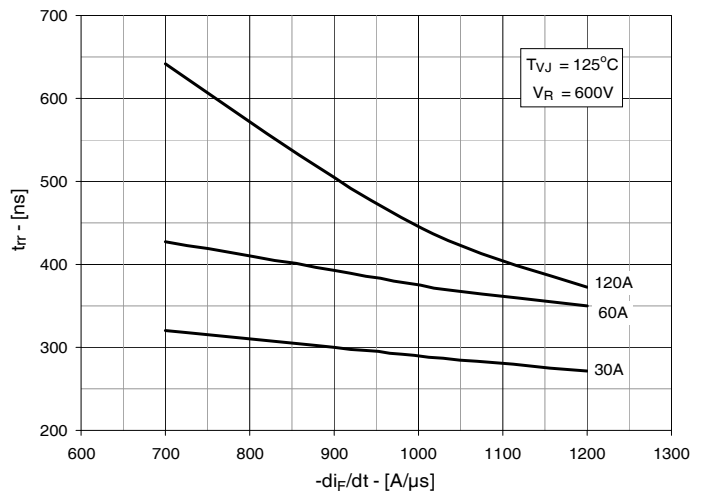


Fig. 25. Recovery Energy E_{rec} vs. $-di_F/dt$

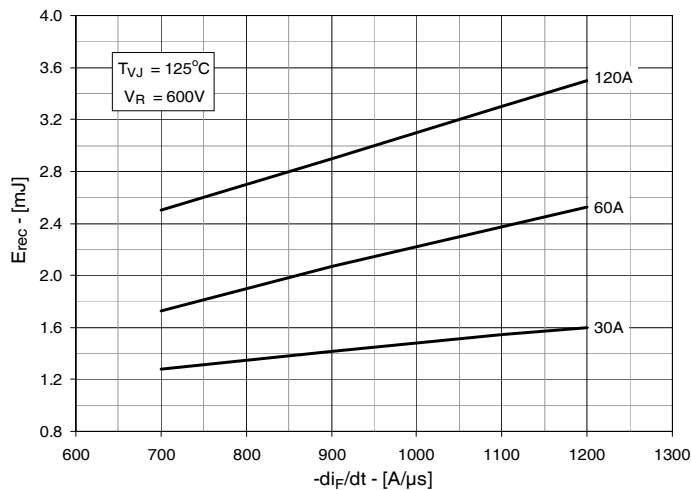
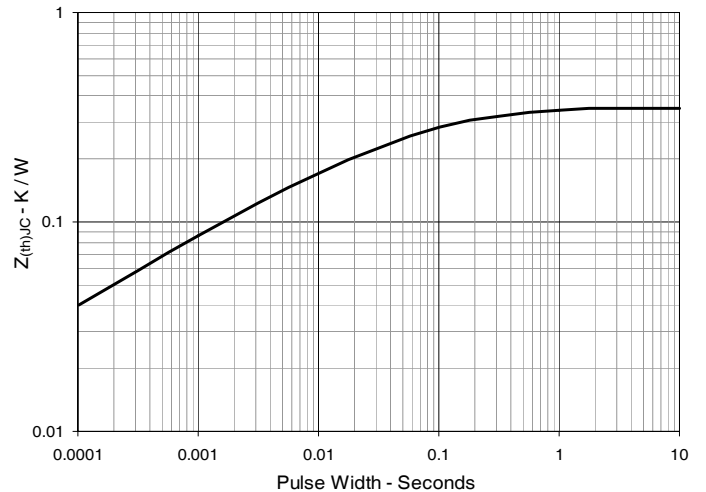


Fig. 26. Maximum Transient Thermal Impedance





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